



UNITED STATES COAST GUARD ACADEMY

Science Lecture Series

Rulers for Light: Optical Frequency Combs and their Design, Construction, and Implementation in Precision Measurement

Dr. Daniel Maser

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An optical frequency comb is a highly specialized laser; in particular, it behaves like a combination of hundreds of thousands of lasers, which allow it to act as a "ruler" for light. Frequency combs feature in applications ranging from synchronizing atomic clocks, finding exoplanets around distant stars, measuring the concentrations of greenhouse gases in the atmosphere, assisting in the search for dark matter, and even measuring how gravity affects the passage of time. In this presentation, I will discuss our construction and stabilization of these devices with my undergraduates at Connecticut College, as well as their application in precision molecular spectroscopy, allowing us to better understand the internal structure of molecules.

Wednesday, October 29th, 2025

2000 -2100

Dimick Auditorium, U.S. Coast Guard Academy

Dr. Daniel Maser's research focuses on low-cost construction and stabilization of fiber-based optical frequency combs and their usage to precisely measure near-infrared molecular rovibrational transitions. Prior to joining Connecticut College in 2019, Dr. Maser was a Postdoctoral Research Fellow at Williams College, where he worked Prof. Protik Majumder to perform high-precision measurements of atomic transitions in indium and lead. Dr. Maser earned his Ph.D. from the University of Colorado Boulder in 2017, where his dissertation research, conducted at the nearby National Institute of Standards and Technology (NIST), involved demonstrating new methods of generating mid-infrared optical frequency combs.

**If you have any questions regarding the event, please contact Dr. Kanani K. M. Lee
(kanani.km.lee@uscga.edu) for more information.**